Amendments to Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

Claim 1-18 (cancelled).

Claim 19 (withdrawn): A method of representing an audio signal for machine learning comprising:

(a) creating a perceptual representation of said audio signal by performing a frequency domain transform on at least one time-sampled window of a digital representation of said audio signal, said perceptual representation comprising component magnitudes of constituent frequency vectors that comprise said audio signal;

(b) calculating a magnitude of each constituent frequency vector within said audio signal;

(c) grouping each of said constituent frequency vectors into a number of frequency bands;

(d) calculating an average magnitude of said constituent frequency vectors within each of said frequency bands; and

(e) arranging said magnitudes into a learning representation.

20 (withdrawn): The method according to claim 19 wherein said frequency domain transform is a Fast Fourier Transform.

Claim 21 (withdrawn): The method according to claim 19 wherein an average magnitude of said constituent frequency vectors within each of said frequency bands further comprises an aggregate average magnitude over a plurality of said time-sampled windows.

Claim 22 (withdrawn): The method according to claim 21 where said plurality of time-sampled windows comprises 12 time-sampled windows.

Claim 23 (withdrawn): The method according to claim 19 wherein no said frequency band includes any frequency greater than 11 kHz.

Claim 24 (withdrawn): The method according to claim 19 wherein said frequency bands grow in size according to the golden ratio of frequency with respect to pitch.

Claim 25 (withdrawn): The method according to claim 19 further comprising the step of converting said audio signal into a pulse code modulated bitstream for processing by said frequency domain transform.

Claim 26 (withdrawn): A computer readable storage medium, storing therein a program of instructions for causing a computer to execute process of representing an audio signal for machine learning, said process comprising the steps of:

(a) creating a perceptual representation of said audio signal by performing a frequency domain transform on at least one time-sampled window of a digital representation of said audio signal, said perceptual representation comprising component magnitudes of constituent frequency vectors that comprise said audio signal;

(b) calculating a magnitude of each constituent frequency vector within said audio signal;

(c) grouping each of said constituent frequency vectors into a number of frequency bands;

(d) calculating an average magnitude of said constituent frequency vectors within each of said frequency bands; and

(e) arranging said magnitudes into a learning representation.

Claim 27-43 (cancelled).

Claim 44 (withdrawn): An apparatus for representing an audio signal for machine learning comprising:

(a) a means for performing a frequency domain transform on at least one time-sampled window of a digital representation of said audio signal, said perceptual representation comprising component magnitudes of constituent frequency vectors that comprise said audio signal;

(b) a means for calculating a magnitude of each constituent frequency vector;

(c) a means for grouping each of said constituent frequency vectors into a number of frequency bands;

(d) a means for calculating an average magnitude of said constituent frequency vectors within each of said frequency bands; and

(e) a means for arranging said magnitudes into a learning representation.

Claim 45 (withdrawn): The apparatus according to claim 44 wherein said means for performing a frequency domain transform comprises a means for performing a Fast Fourier Transform.

Claim 46 (withdrawn): The apparatus according to claim 44 wherein no said frequency band includes any frequency greater than 11 kHz.

Claim 47 (withdrawn): The apparatus according to claim 44 wherein said frequency bands grow in size according to the golden ratio of frequency with respect to pitch.

Claim 48 (withdrawn): The apparatus according to claim 44 further comprising a means for converting said audio signal into a pulse code modulated bitstream for processing by said frequency domain transform.

Claim 49 (new): A method of extracting classifying data from an audio signal, the method comprising the steps of:

processing a perceptual representation of the audio signal into a learning representation of the audio signal; and

inputting the learning representation into a multi-stage classifier, the multi-stage classifier comprising a first stage of support vector machine classifiers and a final stage metalearner classifier, each support vector machine classifier trained to identify one out of a plurality of audio classification categories and where the support vector machine classifiers are used to generate a metalearner vector that allows the final stage metalearner classifier to classify the audio signal into one out of the plurality of audio classification categories.

Claim 50 (new): The method of claim 49 wherein the final stage metalearner classifier is a neural network classifier.

Claim 51 (new): The method of claim 49 wherein each support vector machine classifier outputs a value reflecting how closely the audio signal conforms to the one out of the plurality of audio classification categories, each value then used in the metalearner vector.

Claim 52 (new): The method of claim 49 wherein said audio classification categories comprises classifications by musical artist.

Claim 53 (new): The method of claim 49 wherein the learning representation comprises dividing the perceptual representation of the audio signal into a plurality of time slices.

Claim 54 (new): The method of claim 49 wherein the learning representation comprises dividing the perceptual representation of the audio signal into a plurality of frequency bands.

Claim 55 (new): A computer readable storage medium, storing therein a program of instructions for causing a computer to execute a process of extracting classifying data from an audio signal, the process comprising the steps of:

processing a perceptual representation of the audio signal into a learning representation of the audio signal; and

inputting the learning representation into a multi-stage classifier, the multi-stage classifier comprising a first stage of support vector machine classifiers and a final stage metalearner classifier, each support vector machine classifier trained to identify one out of a plurality of audio classification categories and where the support vector machine classifiers are used to generate a metalearner vector that allows the final stage metalearner classifier to classify the audio signal into one out of the plurality of audio classification categories.

Claim 56 (new): The computer readable storage medium of claim 55 wherein the final stage metalearner classifier is a neural network classifier.

Claim 57 (new): The computer readable storage medium of claim 55 wherein each support vector machine classifier outputs a value reflecting how closely the audio signal conforms to the one out of the plurality of audio classification categories, each value then used in the metalearner vector.

Claim 58 (new): The computer readable storage medium of claim 55 wherein said audio classification categories comprises classifications by musical artist.

Claim 59 (new): The computer readable storage medium of claim 55 wherein the learning representation comprises dividing the perceptual representation of the audio signal into a plurality of time slices.

Claim 60 (new): The computer readable storage medium of claim 55 wherein the learning representation comprises dividing the perceptual representation of the audio signal into a plurality of frequency bands.

Claim 61 (new): An apparatus for classifying an audio signal comprising:

means for processing a perceptual representation of the audio signal into a learning representation of the audio signal; and

a multi-stage classifier, the multi-stage classifier further comprising a first stage of support vector machine classifiers and a final stage metalearner classifier, each support vector machine classifier trained to identify one out of a plurality of audio classification categories from the learning representation of the audio signal and where the support vector machine classifiers are used to generate a metalearner vector that allows the final stage metalearner classifier to classify the audio signal into one out of the plurality of audio classification categories.

Claim 62 (new): The apparatus of claim 61 wherein the final stage metalearner classifier is a neural network classifier.

Claim 63 (new): The apparatus of claim 61 wherein each support vector machine classifier outputs a value reflecting how closely the audio signal conforms to the one out of the plurality of audio classification categories, each value then used in the metalearner vector.

Claim 64 (new): The apparatus of claim 61 wherein said audio classification categories comprises classifications by musical artist.

Claim 65 (new): The apparatus of claim 61 wherein the learning representation comprises dividing the perceptual representation of the audio signal into a plurality of time slices.

Claim 66 (new): The apparatus of claim 61 wherein the learning representation comprises dividing the perceptual representation of the audio signal into a plurality of frequency bands.